In pursuit of progress toward a resilient Delta

2016 Annual Report

Delta Stewardship Council

A California State Agency

The Sacramento-San Joaquin River Delta: Hub of California's Water Supply

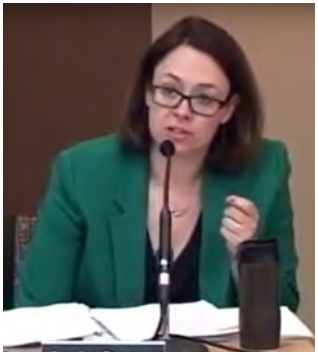
Who Depends on the Delta?

Bay Area
33%

Central Valley
23%-90%

Southern California
30%

From the Executive Officer



Jessica R. Pearson

Spend any amount of time working on the Delta and it's easy to see why scientists describe it as a "wicked" problem - one that is difficult or impossible to solve because of incomplete, contradictory, and changing requirements that are often difficult to reconcile.

The Delta paradox in a nutshell is this: how to provide both water supply reliability and ecosystem health in a system that has been severely altered over time and faces both old and emerging, and compounding challenges. There's the need to have the right amount of water, at the right temperature, at the right time for various fish species. That water for fish is entangled with infrastructure developed more than half a century ago designed around a now changing hydrograph (more rain, less snow, earlier runoff) and originally developed to serve only a fraction of the people, farms, and industry that now rely upon its deliveries.

All this happens in an estuary that has changed drastically from wetland marsh to a network of leveed and drained agricultural islands and tracts, through waterways that have been dredged and channelized for flood protection and maritime transportation, suffer from intentional and accidental introductions of non-native species, and are affected by contaminants running off our towns and farms. On top of those already daunting challenges we face a changing climate with rising temperatures and seas.

As a result, headlines on the topic are dominated by the bad news: the low and declining numbers of threatened and endangered fish species, reductions in urban and agricultural water deliveries, both exacerbated over the past five years by another of California's periodic droughts. It's easy to lose sight of the progress that's being made.

But every story has at least two sides and in 2016, we at the Delta Stewardship Council (Council) also saw signs of progress, laudable successes, and reasons for optimism.

The Council's Delta Plan charts a course that over the long-term will allow California to manage, if not solve, this "wicked" problem. Our unique role and science-focused mandate offer a paradigm shift for how to approach Delta solutions. Major elements of the Delta Plan hit significant implementation milestones in 2016:

- Ground was broken on several significant Delta ecosystem restoration projects after more than 20 years of discussion, planning and permitting.
- After more than 10 years of planning and evaluation of various alternatives, California WaterFix – a proposal to improve the way water moves across the Delta to the State and federal water projects –issued its final environmental report and entered its permitting phase.

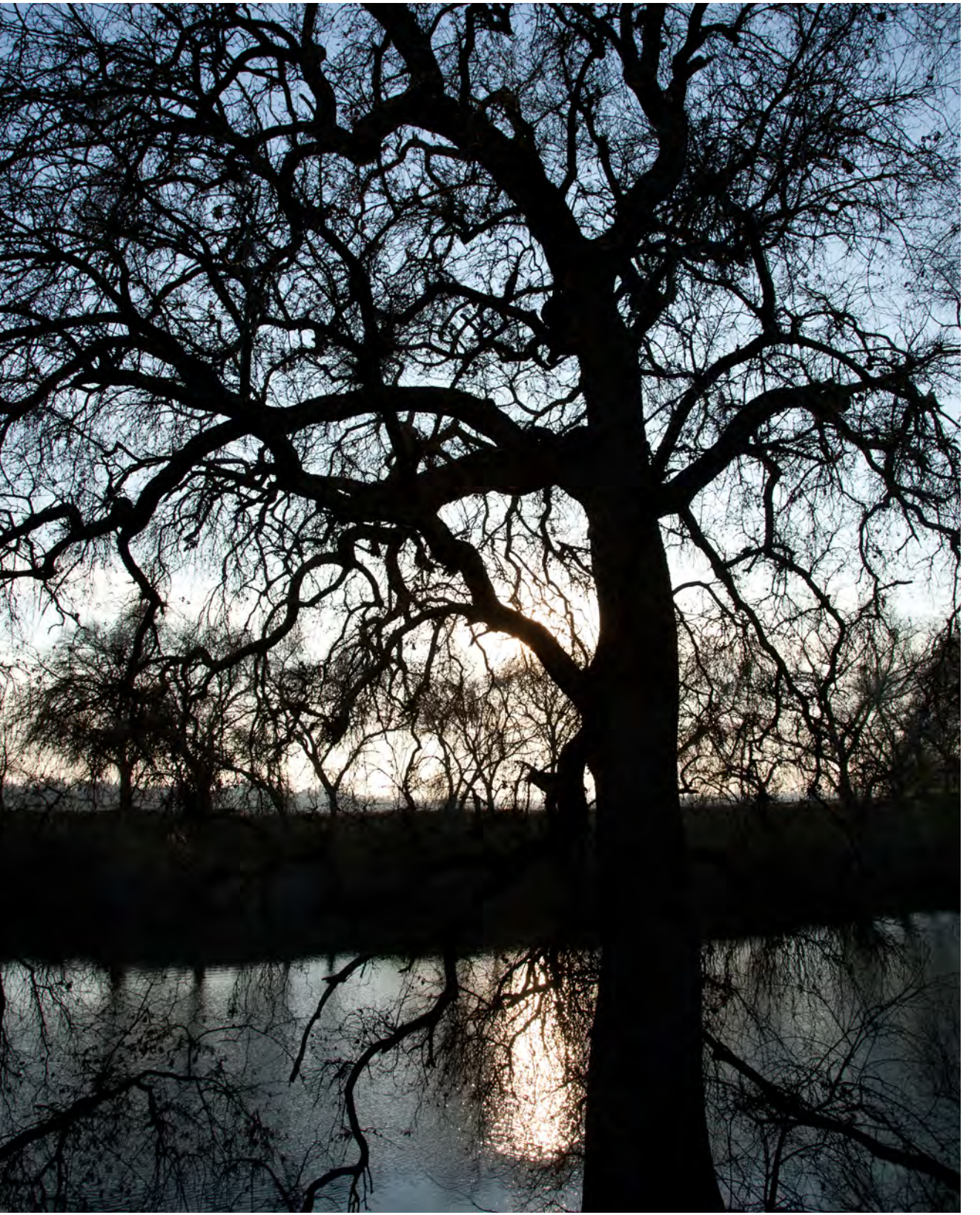
- Requirements for the amount of water that must flow into and through the Delta to protect and balance human and ecosystem uses are undergoing a much-needed update by the State Water Resources Control Board.
- Investments in water storage move closer to reality with the adoption of rules to govern the distribution of nearly $3 billion dollars in coming years.

Specifically, the Council had a direct hand in these successes:

- Council staff worked successfully with San Joaquin County to ensure that nearly 2,000 acres of farmland were protected and that new development doesn't create barriers to wildlife and fish habitat restoration along the San Joaquin River.
- Focused and relevant scientific workshops and peer reviews facilitated by the Council ensured that key Delta projects are founded on the best available science, with adequate monitoring and review to allow for future course corrections.
- The Council brought together scientists and policy makers from around the nation in a unique workshop setting to better understand and improve the way science is both organized and brought to bear on both long-term and day-to-day complex ecosystem and water supply management decisions.
- The Council's Delta Science Program issued an update to the seminal State of Bay-Delta Science, a compendium of science synthesis articles which build upon a foundational base of knowledge to inform critical management decisions.
- In response to a legislative directive, the Council advanced a strategy for State investment in Delta levees that is informed by an innovative computer-based, interactive planning tool.

And the Council continues to highlight issues, facilitate data- and science-driven solutions, and focus agencies and stakeholders on long-term comprehensive approaches in the most publicly accessible manner possible.

There is no doubt that conflict between the coequal goals will continue to challenge Delta management. Sometimes, however, two steps backwards are only the prelude to a significant leap forward in the world of Delta public policy and achieving the coequal goals. Finding the right balance requires a willingness to compromise, a commitment to using the best available science, and adapting to changing circumstances. A tall order, but one agencies and stakeholders are working to fill every day. In this report, you'll find those stories.



Delta Stewardship Council: Planning for the Long-Term

Delta Plan sets the course for sustainable management of the Delta

Coordination and collaboration key to implementation

Council uses performance measures to gauge progress toward coequal goals

The Council was established in 2010 with a primary mission to achieve the State's "coequal goals" for the Delta: providing a more reliable water supply for California while protecting and restoring the Delta's ecosystem, both achieved in a manner than respects and enhances the Delta's unique character. The Council's chief tool, the Delta Plan, was required by the Legislature to be a legally enforceable long-term management plan for the Delta, including the Suisun Marsh. It was adopted in 2013 and is administered by the Council, an independent seven-member appointed board.

The Council works to achieve the coequal goals for the Delta through everyday actions that support implementation of the Delta Plan. We use a formal, covered action consistency review process, as well as monthly public Council meetings to ensure actions are consistent with the Delta Plan's 14 regulations and 73 recommendations. But we also work collaboratively with local, State, and federal agencies, Delta residents, and non-governmental organizations to ensure that plans and actions are consistent with the Delta Plan's regulations and recommendations.

Consultation and coordination efforts occur on a range of topics including risk reduction, regional self-reliance for water supply, water storage, protections and enhancements for the Delta's recreational and agricultural economy, and ecosystem restoration. They also occur for specific projects or programs that affect the management of water supply, ecosystem, or flood control. Collectively these regulations provide important Delta protections that would not otherwise exist.

Implementing the Delta Plan

Implementation of the Delta Plan is well underway. The Council tracks administrative actions and output/outcomes of actions through a set of performance measures. The aim of performance measures is to increase the level of accountability and transparency on government actions in the Delta. In 2016, the Council released Delta View, an online web-based tracking program that allows the public and agencies to understand how much money is being spent on projects in the Delta and how these projects contribute to the implementation of the Delta Plan.

The Council has statutory authority to require that State and local agencies certify that their plans, programs and/or projects are consistent with the Delta Plan. The latter includes informal staff-level discussions with project proponents – "early

The Delta Plan Interagency Implementation Committee serves as a forum to discuss, consider, and orchestrate the timely and orderly implementation of actions that further the coequal goals consistent with the Delta Plan and with the annual priorities set by the Council.

consultations" – that assist them in determining their required consistency with the Delta Plan's 14 regulatory policies, as the law intended.

This year, certifications were filed with the Council for the Tule Red Restoration Project, a restoration project in the Yolo Bypass, and a levee and habitat improvement project in the Southport area of West Sacramento. Several more are in preparation. In addition, 10 projects underwent early consultation, and the Council provided more than 20 formal comment letters intended to ensure that projects that are not subject to the Council's direct oversight are nonetheless consistent with the Delta Plan and further the coequal goals.

The following pages highlight key 2016 actions taken by the Council and the many agencies charged with implementing the Delta Plan.

Engaging with Delta Leadership

The Delta Plan Interagency Implementation Committee (DPIIC) serves as a forum to discuss, consider, and orchestrate the timely and orderly implementation of actions that further the coequal goals consistent with the Delta Plan and with the annual priorities set by the Council. The DPIIC has priority-focused discussions to identify where consensus-based action can improve ecosystem management, especially as it pertains to supporting decision making with best-available science, and supporting Gov. Jerry Brown's California Water Action Plan. The DPIIC, which met in May and November 2016, helps maintain accountability through coordinated actions and progress updates covering multiple programs, plans, and projects being carried out by the more than 225 State, federal and local agencies with some degree of jurisdiction in the Delta.

Amending and Updating the Delta Plan

The Council is required to review the Delta Plan at least every five years. To be responsive to changing circumstances and in accordance with commitments made in the 2013 Plan, the Council amended the Delta Plan twice in 2016, and work on two other amendments began.

Performance Measures: When adopted, the Delta Plan contained preliminary performance measures developed to monitor implementation of Delta Plan policies and recommendations. The Delta Plan identified the need for the Council to continue to work with scientific, agency, and stakeholder experts to further refine the Delta Plan's performance measures. The Council subsequently conducted a rigorous public process and adopted new and refined performance measures in February.

Single-Year Water Transfers: Following a public workshop and four Council meetings over the course of 2015, the Council this year conducted an environmental review and adopted a regulatory amendment that exempts single-year water transfers from regulation

under the Delta Plan and simplifies implementation of these short-term transfers.

Two additional updates are currently underway:

Conveyance, Storage, and Operations: The Delta Plan as adopted in 2013 called for completion of the Bay Delta Conservation Plan (BDCP). Pursuant to the Delta Reform Act of 2009, the BDCP, if it met all other requirements of law, was to be automatically incorporated into the Delta Plan. The Delta Plan also said that if the BDCP were not approved by Jan. 1, 2016, the Council would consider amending the Delta Plan to promote options for new conveyance and storage projects and how they could be operated.

In April 2015, the Brown Administration announced a new preferred alternative to the BDCP that would not complete the BDCP as a Natural Community Conservation Plan (NCCP), but instead construct water conveyance facilities through an initiative called California WaterFix.

To fulfill the Delta Plan's directives, the Council this year directed staff to develop a proposed amendment to the Delta Plan regarding Delta conveyance, water storage, and the operation of both. To guide the amendment, the Council adopted 19 Principles in late 2015.

Delta Levees Investment Strategy: The Delta Reform Act of 2009 requires the Council to lead a multi-agency effort to recommend priorities for State investments in the Delta levee system to protect people, property, and State interests, while advancing the coequal goals. In response, the Council is developing a Delta Levees Investment Strategy (DLIS) that combines risk analysis, economics, engineering, and decision-making techniques in an innovative approach to identify funding priorities and assemble a comprehensive investment strategy for Delta levees.

Tracking the Delta Plan

Performance measures translate the Delta Plan's goals and objectives into measurable indicators of progress and provide decision-useful information about the status and trends toward achieving the coequal goals. Measuring the progress of Delta Plan implementation is fundamental to determining the success of the Plan, as well as ensuring the proper use of adaptive management techniques in fine-tuning the Plan's implementation.

In addition to amending the Delta Plan to refine its initial performance measures, the Council this year unveiled a new online tool to help agencies and the public track projects and progress in the Delta. DeltaView is a new database to track current State and federal spending on programs and projects that are "implementation-ready," funded through the State and/or federal governments, and located at least partially in the Delta. The projects, programs, and plans contained in DeltaView can be viewed by their links to key Delta Plan elements (e.g. policies, recommendations, core strategies, and performance measures).

2016: Making progress toward a resilient Delta

The Council is a State agency with broad responsibility to further the State's coequal goals of improved statewide water supply reliability and a restored and enhanced Delta ecosystem, both achieved in a way that protects and enhances the unique and evolving character of the Delta itself. The Council also is tasked with ensuring that best available science guides the projects, programs, and plans that affect the Delta.

January

- **List of critically overdrafted groundwater basins released** covering most of the San Joaquin Valley
- Workshop to begin **updating Mercury Strategy** for the Bay-Delta Ecosystem

February

- Council amends Delta Plan to include **revised performance measures**

March

- **Phil Isenberg completes term** on the Council
- Council's Delta Science Program participates in the **Delta Smelt and Longfin Smelt Symposium**

April

- Lead Scientist Cliff Dahm discusses ways the Council's Science Program **informs issues before the State Water Resources Control Board**

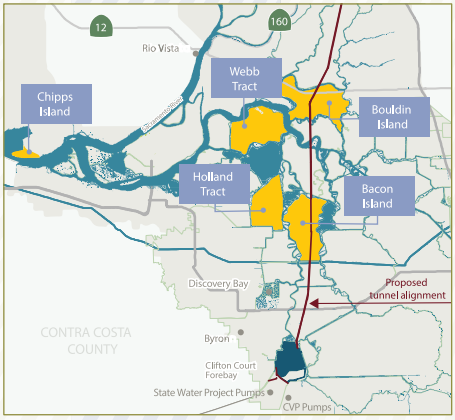
May

- **Delta Plan Interagency Implementation Committee** discusses prioritization of High-Impact Science Actions and advancements in Delta habitat restoration
- **Mandatory statewide water conservation regulations end**; locally developed water conservation standards begin
- 15 branches of federal, State, and local government sign **agreement to plan for flood management and ecosystem restoration** in the Yolo Bypass and Cache Slough region
- **Tule Red habitat restoration project certified** consistent with Delta Plan
- **Sustainable Groundwater Management Act regulations approved** by the California Water Commission

June

- **Governor Brown appoints Ken Weinberg** to Council
- Council hosts public **workshops on Delta Levees Investment Strategy**

MWD Delta purchase



Council meeting

The Council does this through regulatory authority to enforce principles set forth in our Delta Plan, a long-term multi-agency management plan that includes both regulatory policies and recommendations, and through the Delta Science Plan, a multi-agency guide to establishing a common base of knowledge and the ability to integrate that knowledge into both long-term and day-to-day operational decisions. While much of the Council's work doesn't grab headlines, it helps shape and improve the projects that do.

July

- **Strategy to promote delta smelt resiliency** released
- **Hearings begin** on proposed change in water diversion for **California WaterFix**
- **Susan Tatayon elected vice-chair** for the Council

- Council hosts workshop to help water managers use **Sacramento River Temperature Model**

August

- Council released beta version of **DeltaView database of projects**
- Kickoff for **Delta Conservation Framework stakeholder workshops** that will help develop Delta Plan ecosystem restoration amendment
- Delta Levees Investment Strategy **Risk Analysis Methodology Report** released
- Council amends Delta Plan to **streamline single-year water transfer process**

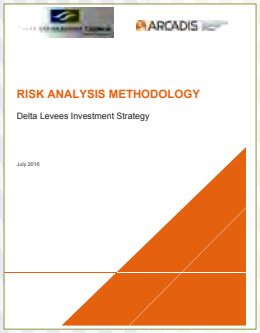
September

- **Groundbreaking for Tule Red** habitat restoration project
- Water Board Releases **Draft Flow Objectives for San Joaquin River**; **Salinity Objectives for the Southern Delta**

October

- **Wallace Weir salmon protection project** groundbreaking
- Council hosts seminar to enhance the understanding of **improving habitat by improving water quality**

Delta Levees Investment Strategy (DLIS) Risk Analysis Methodology Report, July 2016



November

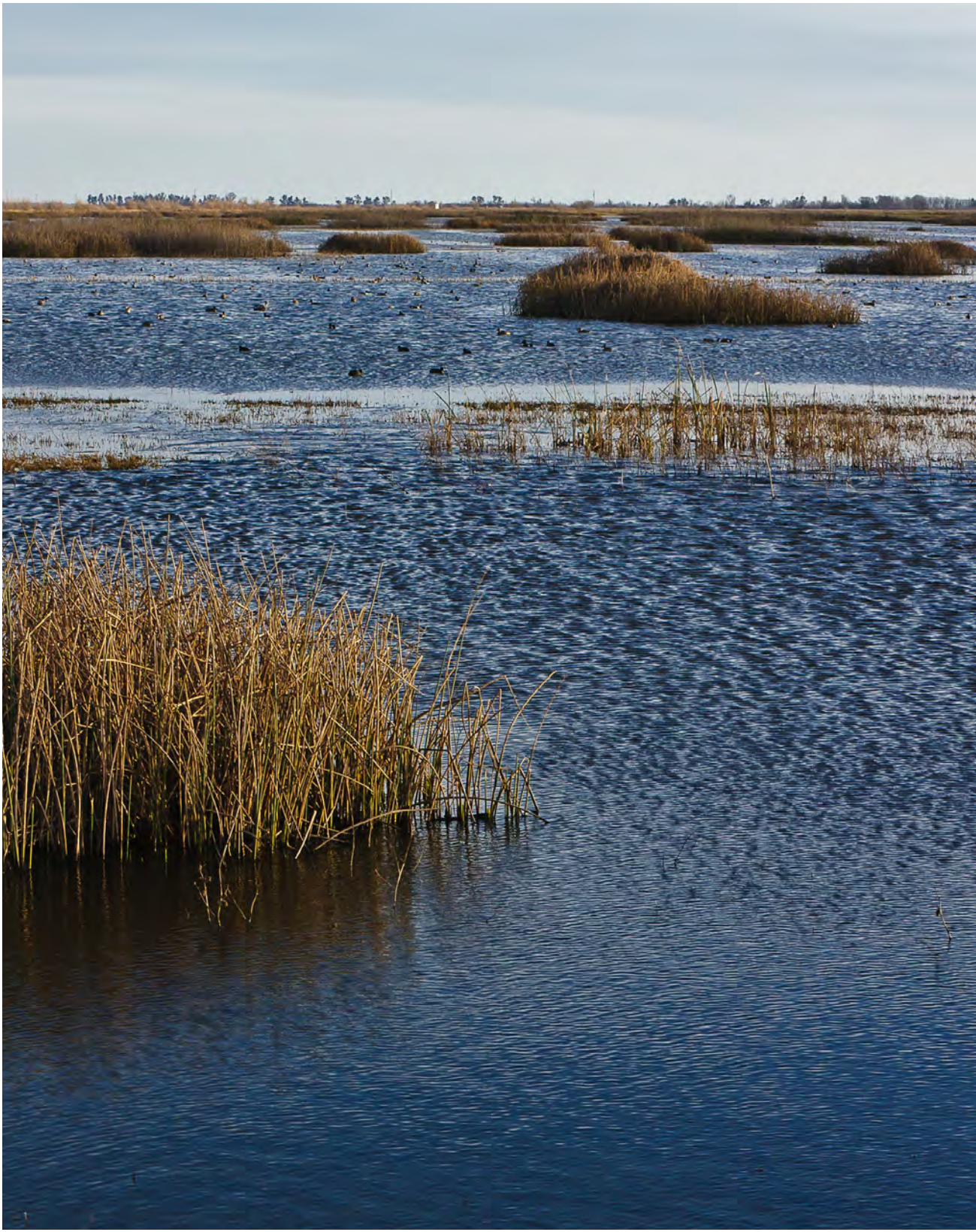
- Council and US Geological Survey host **Science Enterprise Workshop** brings leaders of restoration projects across the nation to improve awareness of the Delta and science
- Council and US Geological Survey host **9th Biennial Bay-Delta Science Conference**
- Council released update of science report updating the **State of Bay-Delta Science**
- **Delta Plan Interagency Implementation Committee** discusses ways to improve integration of science into management decisions and commits to collaborative advancement of Delta habitat restoration.

December

- Council releases discussion draft of **Delta Plan policies and recommendations for State investments in Delta levees**
- **Mary Piepho completes term** on the Council as chair of the Delta Protection Commission

Groundbreaking at Wallace Weir

Delta Smelt



Best Available Science Informs Decision Making

Science Plan: Collaborate, cooperate to develop common body of knowledge

New report synthesizes advances in science, urges long-term view

Council works to integrate best available science in day-to-day decisions

The Delta Reform Act requires that the Delta Plan be based on, and implemented, using the best available science, with the use of science-based, transparent, and formal adaptive management strategies for ecosystem restoration and water management decisions.

To do this, the Council adopted a Delta Science Plan to guide efficient use of resources, balancing investments to address short-term (next 5-10 years) science needs and those that build understanding over the longer term. This plan lays out strategies for addressing uncertainty and conflicting scientific information, the prioritization of research, near-term science needs, and financial needs to support Delta science.

Developed in consultation with agencies, academics, and stakeholders, the Delta Science Plan – like the Council's Delta Plan – is implemented by multiple agencies and institutions. In this, the Council takes a synthesizing and coordinating role, gathering the right people to work on the right issues and facilitating independent peer review to enhance the reliability of scientific work among different agencies and programs.

The Council also appoints the members of the Delta Independent Science Board (Delta ISB), who are nationally prominent scientists with appropriate expertise to provide oversight of the scientific research, monitoring, and assessment programs that support adaptive management of the Delta.

The Brown-Nichols Science Award recognizes contributions for significant research and active involvement in facilitating the use of science to manage the San Francisco Estuary and watershed. The 2016 winner, Jeffrey Mount is joined by Frederic Nichols (right) for whom the award is named along with Randall Brown. Together Drs. Brown and Nichols laid the foundation for the first Bay-Delta Science Conference in 2000.

One Delta, One Science – A Shared Base of Knowledge

The Delta Science Plan works to enact a vision of 'One Delta, One Science,' meaning an open and integrated Delta science community that works together to build a shared state of knowledge with the capacity to adapt and inform current and future water and environmental decisions in the Delta.

Three major efforts this year deserve recognition:

State of Bay-Delta Science 2016 – Successfully implementing the Delta Science Plan requires knowing what has happened in the past as well as what likely lies ahead. Leading Delta scientists this year chronicled the state of science in the Bay-Delta – last done in 2008 – through a series of peer-reviewed papers that detail current knowledge about issues such as the long-term viability of native species, the effects of climate

"The work that the Delta Stewardship Council and the Independent Science Board is doing to change the debate around science in the Delta, I think has been very helpful. We're never going to have consensus on science, I suspect, but hopefully we can at least have a platform that we can all kind of work from, and I think that will be an important platform going forward in a lot of the work that they're doing."

— David Guy, President, Northern California Water Association

change, improved understanding of Delta flow dynamics, water-borne contaminants and nutrients, and factors affecting Delta levee vulnerability.

A companion summary pointed to three overarching conclusions:

1) The capacity of the Delta to absorb extremes of all kinds is declining. In the future, water managers will have to adjust to reduced and more variable inflows to the Delta and to less predictable sources of water supply. Sustaining a Delta ecosystem hospitable to native species will be much more difficult.
2) The Delta food web has changed dramatically, new stressors are added daily and several native species are virtually extinct. While we must continue to try to shore up endangered species such as the delta smelt, it is time for serious debate about how successful restoration efforts can be for some native species and what other alternatives can be pursued.
3) While the need for science is often focused on immediate crises (decline of the delta smelt, effects of the current drought), scientists need to join planners in long-range thinking, developing an understanding of changes that are coming, particularly those associated with climate change.

9th Biennial Bay-Delta Science Conference – Every two years, more than a thousand scientists, engineers and resource managers meet in Sacramento at one of the nation's premier science conferences to learn about the latest research and exchange ideas. Hosted by the Council and the United States Geological Survey (USGS), this conference fosters the collaboration among scientists, managers, and stakeholders that is necessary for research to be both useful (informative) and useable (directly applicable to decision-making).

The theme for this year's conference was Science for Solutions: Linking Data and Decisions. Six plenary presentations opened the conference, discussing aspects of how science can effectively inform policy and management decisions in California. Throughout three days, 185 oral presentations and panel discussions were grouped into 38 sessions on such topics as: habitat restoration and conservation; climate, drought, and water management; winter-run Chinook salmon science and management; and contaminant issues in the Bay-Delta. In addition, more than 175 posters were presented as a way to get scientists to share and discuss their work. The posters were clustered into 22 groups including: water and sediment quality; modeling; outreach and communication; food webs; and fish biology, ecology, and protection.

The conference included extensive conversation about strategies for communicating science to policy makers, water managers, and the attentive public. An "art of data visualization" panel and art exhibition was a component of science communication at the conference. These events paired local artists with scientists to explore how art and science can work together to increase awareness of estuarine ecology.

Science Enterprise Workshop – This first-of-its-kind workshop hosted by the Council and the USGS explored how science is being conducted in several high-profile aquatic ecosystems and identified common themes and variations in the approaches. The two-day workshop brought together officials from six programs around the country, including Chesapeake Bay, Coastal Louisiana, Great Lakes, Greater Everglades, Puget Sound, and the Bay-Delta.

The workshop was designed to help managers and policymakers:

- Better integrate science, including the social, biological, chemical and physical aspects of a complex system
- Better understand governance and management systems that jointly manage resources and conduct science
- Identify practical ways to manage financial and intellectual resources and maintain relevant research and monitoring
- Understand perspectives on what makes science "legitimate" to stakeholders and the public

In early 2017, the Science Enterprise Workshop Findings & Outcomes Report will be released. The report will identify key components of effective science enterprises; lessons learned that are applicable to the broader context of ecosystem management. As well, it will feature key recommendations and actions for DPIIC Member Agencies to improve science management, funding, and effectiveness in new and ongoing efforts here in the California Bay-Delta like integrated modeling and forecasting, joint funding initiatives, science communication, integration of social sciences, updates and implementation of the Delta Science Plan.

In 2016, the Council used multiple social media platforms to connect and engage with stakeholders by sharing updates on science, events, and news in the Sacramento-San Joaquin Delta.

Improving knowledge through research and understanding

One of the key roles of the Council's Delta Science Program is to fund research that will inform long-term and day-to-day planning and operational decisions. Key findings from the last round of research funds distributed in previous years and published between 2013 and 2016 were synthesized and incorporated into the 2016 update of the State of Bay Delta Science.

New research projects were funded in 2016, in close coordination with agencies represented on the DPIIC. They included evaluation of the effects of drought response actions, deployment of new telemetry equipment to track out-migrating salmon through the South Delta and assess means to improve their survival rate on their journey to the ocean, assessing restoration benefits in the Northeast Delta, and informing a range of management options to enhance survival of endangered fish species, particularly in their juvenile life stages.

A commitment to the future

One of the goals of the Council's Delta Science Fellows Program is to partner junior scientists with Delta agency scientists and senior research mentors to work collaboratively on research projects and data analyses and syntheses relevant to Delta policy and management. The Council does this in cooperation with the California Sea Grant Program, which offers fellowships in research, natural resource management, and marine policy that allow graduate students, post-graduates, and postdoctoral researchers to explore their interests and broaden their experience.

So-called "Science Fellows" are research-focused and are either doctoral candidates or post-doctoral researchers who undergo a rigorous application and screening process, similar to that applied by the National Science Foundation. Science fellows' research emphasizes the high priority science actions identified by DPIIC, providing prompt and cost-effective attention to these important topics all the while investing in future Delta scientists. Thus far, the program has invested more than $10 million in 80 projects including such topics as new technology and methods for cost-effectively assessing levee vulnerability, and remote sensing of mercury hot spots.

In addition, we utilize "State Fellows" who work in the offices of the Council to assist with both science and planning components of the agency.

Improving Water Supply Reliability

PERFORMANCE SNAPSHOT

Progress: Water Supply Reliability

Council streamlines process for water transfers

Effort to improve storage capacity and movement of water across the Delta

Californians continue to conserve after emergency drought regulations end

The Delta Plan lays out a strategy to achieve the coequal goal of providing a more reliable water supply for California by better matching the state's demands for reasonable and beneficial uses of water to the available water supply.

This is done by promoting, improving, investing in, and implementing projects and programs that improve the resiliency of the state's water systems, increasing water efficiency and conservation, increasing water recycling and use of advanced water technologies and improving groundwater management. It also means expanding water storage capacity and improving Delta conveyance and water project operations.

Two major activities for the Council in 2016 involved amending the Delta Plan to help ensure improved statewide water supply reliability.

Streamlining the process for single-year water transfers

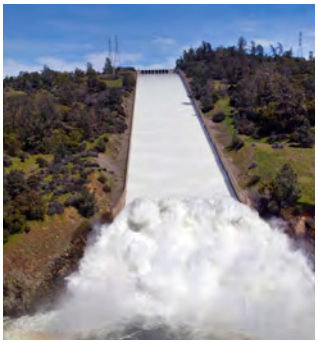
North-to-south water transfers across the Delta can be an important tool for improving water supply reliability, especially in drought years when some water rights holders may choose to sell a portion of their water supply to areas of the state that are harder hit or are willing to place a greater value on that water.

In drafting the Delta Plan, the Council heard testimony about the importance of single-year transfers, but also heard concerns of potential impacts to the Delta ecosystem due to these transfers. As a result, while the Council exempted single-year transfers from regulation under the Delta Plan, it provided a sunset date of Dec. 31, 2016 to allow for further fact finding.

Following discussions with experts, stakeholders and members of the public about improved regulatory oversight of single-year water transfers by other agencies and a public workshop, the Council this year completed an environmental review and adopted a regulatory amendment that exempts single-year water transfers from regulation under the Delta Plan and simplifies implementation of these short-term transfers.

Although still in a drought, California is making progress on several fronts to increase long-term water supply reliability for the State. Implementation of the Sustainable Groundwater Management Act is moving forward on schedule, the California Water Commission is finalizing regulations for quantifying the benefits of Proposition 1 funded water storage projects so that funding may begin in 2017, the California WaterFix continued to proceed through the necessary permitting processes, Department of Water Resources led stakeholder meetings to establish a long-term water conservation framework as called for in Executive Order B-37-16, and the passage of the Open and Transparent Water Data Act puts the Council's recommendation for an integrated statewide system for water use reporting on a path to realization.

Of the Delta Plan's 25 administrative measures for water supply reliability, 5 are completed, 4 have yet to start, and the rest are in varying stages of completion.



The California Department of Water Resources releases water from the Oroville Dam spillway into the Feather River to make way for an expected higher than normal spring and summer runoff. Although much of California saw an increase in precipitation during the winter, the state's snowpack melted quickly and resulted in only a slight net increase in statewide reservoir levels.

Improving conveyance, storage and operations

Amending the Delta Plan – The Delta Reform Act directed the Council to promote options for new and improved infrastructure to convey water across the Delta, expand storage systems, and better integrate the operation of both. It also required the Delta Plan to include, if it met certain conditions, a habitat conservation plan known as the BDCP, which included new infrastructure to convey water across the Delta.

In 2015, however, the state pivoted from BDCP to two separate projects; California WaterFix, to construct the water conveyance pipeline, and California EcoRestore, to restore Delta fish and wildlife habitat. In so doing, it triggered the Council's commitment in the Delta Plan to promote improved conveyance facilities if the BDCP was not permitted by Jan. 1, 2016.

As a result, the Council is moving ahead to amend the Delta Plan so that it provides more guidance on promoting options to improve Delta conveyance, storage, and operations to achieve the coequal goals. At a series of Council meetings, a diverse panel of experts helped the Council to develop 19 principles to guide the amendment process.

Throughout the year, the Council discussed the intent, scope and effectiveness of existing laws and regulations, as well as roles the Council could take to implement the Delta Plan amendment such as coordinating, ensuring consistency, informing, commenting, and providing accountability. A draft amendment will be shaped through public workshops early next year.

Developing guidelines for increased storage – In keeping with the Delta Plan's recommendation for increased water storage, the CWC in 2016 moved closer to implementing its Water Storage Investment Program (WSIP), which will provide $2.7 billion in Proposition 1 funding for improved or additional water storage projects in California.

Through a series of public meetings and workshops, the CWC developed draft regulations to guide the competitive grant process that will award the storage funds and in December adopted final regulations that include the application requirements, evaluation procedures, and a process to award funds.The CWC also solicited and received concept papers of potential applicants to provide more information to the WSIP program as well as encourage the applicants to collaborate and potentially strengthen their applications to provide the most public benefits from Proposition 1 funding.

The resulting projects will increase the State's ability to expand water storage through improved or new surface or sub-surface water storage. The Council reviewed and commented on the draft regulations and periodic meetings with the CWC staff to align their efforts with the Delta Plan amendment on conveyance, storage and operations.

Beginning the WaterFix permitting process – California WaterFix would

upgrade the State Water Project's (SWP) Delta water conveyance system with three new Sacramento River intakes near Hood and Clarksburg and two gravity-fed, 40-foot diameter tunnels to convey the diverted water 30 miles to the existing SWP pumping plants at Clifton Court. It has the potential to alleviate current fish entrainment problems in the south Delta, but has also raised concerns over impacts to water quality based on the amount of Sacramento River flow that would be left to flow into the Delta.

The Water Board this summer began a lengthy hearing process to determine the effect WaterFix would have on both water rights and the estuarine ecosystem of the Delta, Suisun Marsh, and San Francisco Bay.

Keeping the focus on conservation

Although much of California saw an increase in precipitation during the winter, the state's snowpack melted quickly and resulted in only a slight increase in statewide reservoir levels. The increase, however, was enough that the Water Board ended the mandatory conservation regulations that had been implemented starting in 2014, and Governor Brown issued a new executive order for a permanent water use efficiency target for each urban water supplier and for strengthening local Water Shortage Contingency Plans. In response, the Water Board revised its regulations so that urban water agencies have the ability to identify their own conservation standards based on a "stress test" of supply reliability. Water suppliers had to document that they have sufficient supplies to withstand three years of continuous drought or else take additional measures that include State-imposed mandatory conservation standards.

The "stress test" regulation is in effect through January 2017 and, as 2016 ended, the Water Board was considering a longer-term approach to water-use efficiency. In addition, DWR was also working on a framework to incorporate longer-term conservation measures into its program to reduce overall urban water use 20 percent by 2020.

Guiding water supply reliability through science

Updating the Water Quality Control Plan – The Water Board is in a four-phase process to update its Bay-Delta Water Quality Control Plan and, as part of that, set flow objectives for priority tributaries to the Delta to protect beneficial uses in the Bay-Delta watershed. A 2015 report from the Delta ISB, ***Fishes and Flows in the Sacramento-San Joaquin Delta: Strategic Science Needs***, a peer review of Agricultural Economic Effects of Lower San Joaquin River Flow Alternatives, and several workshops developed by the Council's Science Program were foundational to two draft reports released by the Water Board this fall.

Protection means preventing harm to the ecosystem, which could include preventing the conversion of existing habitat, the degradation of water quality, irretrievable conversion of lands suitable for restoration, or the spread of invasive non-native species.

The first draft report proposes flow objectives for the San Joaquin River that would require between 30 and 50 percent of unimpaired flow be allowed to pass into the southern Delta from February to June. The second draft report identifies the science that will be relied upon in considering potential changes to the Bay-Delta Plan, including non-flow measures that should be integrated with flows to reduce the numerous stressors on fish and wildlife. The report, documenting the scientific basis of proposed changes to the Bay-Delta Water Quality Control Plan, is currently being reviewed by the Delta ISB, at the request of the Water Board. The Delta ISB will submit comments in early 2017.

Learning to help fish keep their cool – In recent years, elevated river temperatures in the late-summer and early fall months have been identified as a major factor contributing to the decline of salmon in the upper Sacramento River. One way to reduce these higher water temperatures is to use releases from a deep, cold water pool in Lake Shasta to cool river water in both late summer and early fall. Because Shasta is primarily a water supply reservoir, wildlife and water management officials need to model weather, available water reservoir temperatures, and river temperatures to find the right balance between spring and summer releases for human uses such as agriculture and still have enough cold water to cool river temperatures for fish in the fall – a difficult management challenge.

In its role of developing knowledge that is unbiased, relevant, authoritative and integrated across State and federal agencies, the Council's Delta Science Program this year hosted a workshop to help regulators, water operators, and wildlife officials better understand the various factors influencing river temperatures in order to identify operations best suited for temperature control on the Sacramento River. Although temperature-control plans largely failed in 2014 and 2015, with only 5 percent of juvenile winter-run salmon surviving in 2014 and 3 percent last year, this year's numbers through early November show promise with about twice as many winter-run salmon on the Sacramento River compared to 2015, and a substantial reduction in fish killed due to warm river temperatures.

The Delta Science Program also hosted a workshop to train members of the Sacramento River Temperature Task Group and affiliated staff on the U.S. Bureau of Reclamation's Sacramento River Temperature Model (SRTM). The workshop consisted of hands-on sessions that instructed participants on how to reproduce historical scenarios using the SRTM. These scenarios illustrated important model inputs, interpreted outputs, model hindcasting and forecasting, and identified key modeling assumptions and requirements.

Ecosystem Restoration Gears Up

PERFORMANCE SNAPSHOT

Progress: Ecosystem Restoration

The process for updating the Bay-Delta Plan and establishing new flow objectives for beneficial use has been slow and long overdue. However recent progress has been made. Since the last revision in 2006, the State Water Resources Control Board has proceeded to separate the update into 4 phases. The SWRCB is currently in Phase 1 and 2, and in September of 2016 a draft revised Substitute Environmental Document in support of potential Phase 1 amendments to the Bay-Delta Plan was released for public comment.

Of the Delta Plan's 27 administrative measures for ecosystem restoration, two are completed, six have yet to start, and the rest are in varying stages of completion.

EcoRestore hits milestones as habitat restoration, fish passage projects break ground

Early consultations with Council staff help ensure projects are based on best available science, monitored, and managed for success

As envisioned in the Council's Delta Plan, achieving the coequal goal of ecosystem protection, restoration, and enhancement means successfully establishing a resilient, functioning estuary and surrounding terrestrial landscape capable of supporting viable populations of native resident and migratory species with diverse and biologically appropriate habitats, functional migratory corridors, and appropriate ecosystem processes.

Restoration actions may include restoring interconnected habitats within the Delta and its watershed, restoring more natural patterns of water flows in the Delta, or improving ecosystem water quality. Protection means preventing harm to the ecosystem, which could include preventing damage to existing habitat, the degradation of water quality, irretrievable conversion of lands suitable for restoration, or the spread of invasive non-native species. Enhancement means improving existing desirable habitat and natural processes.

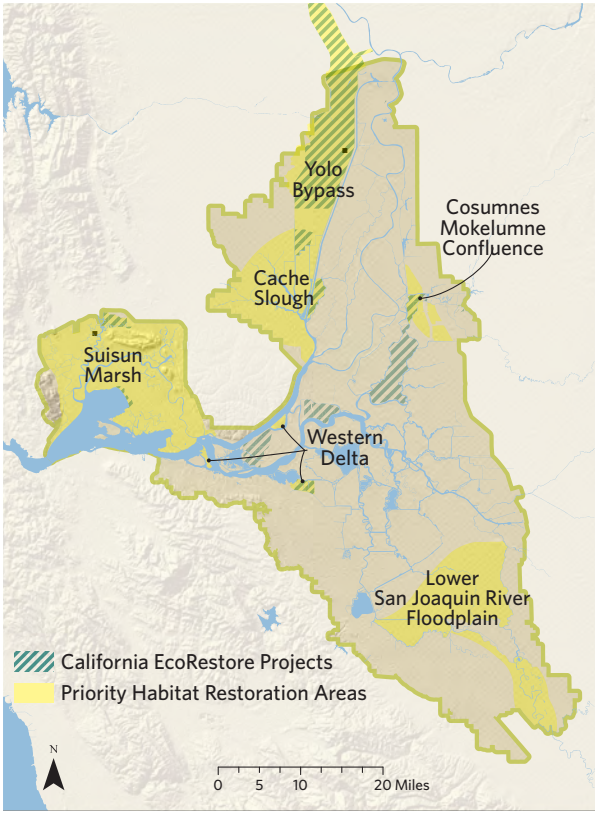
The Delta Plan identifies and protects six priority areas for restoration in the Delta.

Implementing the Delta Plan through California EcoRestore

A major step forward occurred with the advent of California EcoRestore, a 2015 initiative the California Natural Resources Agency implemented in coordination with State and federal agencies including the Council to advance the restoration of at least 30,000 acres of Sacramento-San Joaquin Delta (Delta) habitat by 2020.

Two restoration projects – **Tule Red and Wallace Weir** – broke ground in 2016, while Council staff provided early consultation for nine others. Other projects in California EcoRestore include tidal wetlands, floodplain, upland, riparian, and fish passage improvements. All will be guided by an adaptive management plan being developed in close consultation with the Council's Delta Science Program, that will improve the likelihood of success and promote the concept of learning by doing.

Tule Red Restoration Project – More than a century after people built earthen dikes to block off part of Suisun Marsh to create duck hunting clubs, this public-private partnership in Solano County will open more than 400 acres of wetlands to daily tides. With reworked berms and new channels and basins, the project will create



The map above shows the six Priority Habitat Restoration Areas designated by the Delta Plan, which represent the most promising locations for restoration including the Yolo Bypass, Cache Slough, Suisun Marsh, the Lower San Joaquin River Floodplain, the Cosumnes-Mokelumne Confluence, and select areas in the western Delta. The map compares these areas to the restoration sites of the California EcoRestore initiative. Restoration of these areas is intended to create habitat and support food webs that can help recover native fish, as well as support native wildlife and plants.

habitat to harbor and boost food production for several threatened or endangered species including delta smelt, longfin smelt, and Chinook salmon.

The project, certified consistent with the Delta Plan in the spring, broke ground in September. It is designed not only to provide habitat for delta smelt, longfin smelt, salmonids, and other native fishes, but also to reestablish important ecological processes that will encourage production of the microscopic plants and animals at the base of the food web that nourish native fish. One of the factors that has led to the precipitous decline of delta smelt and other native species is the lack of adequate food resources.

Wallace Weir Fish Rescue Project – Flood control is the major function of Yolo Bypass, which protects Sacramento and other riverside communities by spreading river flows across agricultural fields through a system of weirs during high flow events. These weirs connect the bypass to the Sacramento River as well as to various local creeks from which water eventually drains into the Sacramento-San Joaquin Delta.

This project is intended to help prevent adult Sacramento River salmon from swimming into a drainage ditch that leads from the bypass deep into farm fields where successful spawning cannot occur. By building a permanent barrier across the Knights Landing Ridge Cut, water operators will be able to better control farm drainage releases to avoid attracting salmon. A new fish collection facility adjacent to the weir will allow the California Department of Fish and Wildlife (CDFW) to more effectively capture stray salmon and return them to the river to spawn.

Exempt from the Council's certification process but aligned with the Delta Plan, the project complements work done last year to block fish at the nearby Colusa Basin Drainage Canal, which empties into the Sacramento River near Knights Landing. The idea behind both projects is the same: keep adult salmon from straying out of the Sacramento River in order to boost the odds that those salmon will successfully spawn – and do so without compromising the ability of local farmers to maintain irrigation water levels and manage floods.

Another EcoRestore project is the **Dutch Slough Tidal Marsh Restoration Project**. Certified consistent with the Delta Plan in 2015, it received its final major permit this summer and will commence construction in 2017. This project will restore natural Delta habitats to a 1,187-acre site in the western Delta city of Oakley. The project site

consists of three leveed parcels that will be restored to a mosaic of tidal marsh, riparian woodland, open water, managed marsh, and upland habitats. Construction will consist of earthmoving to create the proper elevations for gradually sloping marsh plain, as well as construction of channel berms, new flood control levees, and the rehabilitation of existing ones. In addition to habitat restoration, the project will provide recreation and educational opportunities to benefit residents of, and visitors to, the Delta.

"We've done more for restoration in the last six months than we've done in the past 20 years."

– Chuck Bonham, Director, California Department of Fish & Wildlife

Guiding restoration efforts through science

In January, the Delta ISB released the report ***Improving Adaptive Management in the Sacramento-San Joaquin Delta***, which reviewed how adaptive management is perceived and used in the Delta and offered recommendations on making adaptive management an integral part of management of the Delta and its resources. This report is guiding the development of the EcoRestore adaptive management program, mentioned above.

The steering committee that is guiding EcoRestore adaptive management, is composed of representatives of several State agencies and will consult with local and federal agencies and stakeholders to determine how the adaptive management program could best be structured and will seek the sustainable resources to implement the program.

The Council also released ***Improving Habitat Along Delta Levees,*** a report that summarizes lessons learned from past levee habitat projects as a way to improve future levee investments so that they contribute to the long-term improvement of river corridors, with net benefits for fish and wildlife.

Council staff also advised the development of a major new report by the San Francisco Estuary Institute that offers guidance for creating and maintaining landscapes in the Delta that support desired ecological functions while retaining their overall agricultural character and water supply functions. ***A Delta Renewed, a Guide to Science-Based Ecological Restoration*** provides recommendations that are intended to help shape long-range ecological planning and provide a practical foundation for a 2017 amendment of the Delta Plan.

CDFW is working with partners to develop a Delta Conservation Framework (Framework), a 25-year restoration plan for the Delta, Suisun Marsh, and Yolo Bypass. This framework is intended to serve as the continuation of EcoRestore beyond 2020. Additionally, the Framework will provide as high level guidance for the development of more focused regional restoration strategies that will involve extensive local participation, such as the Cache Slough Complex planning process convened by the Sacramento-San Joaquin Delta Conservancy (Delta Conservancy). Finally, the Framework will help inform the upcoming amendment to the ecosystem elements of the Delta Plan.

Protecting the Delta's Character, Reducing Risks

PERFORMANCE SNAPSHOT

Progress: Delta as a Place

Efforts to protect and enhance the Delta as an evolving place have continued to move forward. The DPC, in partnership with Sacramento and Yolo counties, gathered a team of experts in community development to assist Delta communities to increase their civic vitality and preserve the values and character of historic Delta towns. Caltrans is in the process of conducting a vulnerability assessment to identify where the State highway system is vulnerable to the impacts of climate change, with an anticipated completion date of late 2018. Also, the Council is working with the State Transportation Authority discussing draft policies and recommendations that consider the effects of flood hazards and sea level rise on state highways in the Sacramento-San Joaquin Delta.

Of the Delta Plan's 24 administrative measures for protecting the Delta as an evolving place, three are completed, two have yet to start, and the rest are in varying stages of completion.

Delta Plan promotes smart development, preserves agricultural land

Council helps fund effort to focus attention on Delta heritage

The Delta Plan envisions a future where the Delta's unique qualities are recognized and honored. Agriculture will continue to thrive on the Delta's rural lands; its cities, ports, and rural villages will be desirable places to live, work, and do business. Visitors to the region will enjoy recreation on and in its waterways, marshes, resorts, parks, and historic legacy communities.

The Delta's land uses and development will be resilient, protecting the rural character of the area, reducing risks to people and property, adjusting to changing conditions, and promoting the ability to recover readily from distress. The Delta's economic vitality will provide resources to respond to change and to support the families and businesses that make the Delta home.

The vision of the Delta as an evolving place also explicitly acknowledges the role of Delta residents in shaping the future of the region through active and effective participation in Delta planning and management.

Promoting smart development and protecting agriculture

General Plans developed by local governments are the keys to guiding development in the Delta. In 2016, after productive consultation with the Council, San Joaquin County adopted an updated General Plan that will direct growth for decades and that is consistent with both the Delta Plan and the region's Sustainable Communities Strategy.

When the Council first began to address the General Plan in 2013 through Environmental Impact Report comments and early consultation, San Joaquin County was proposing to designate nearly 2,000 acres of mostly flood-prone rural agricultural lands for urban uses that would have been inconsistent with the Delta Plan. These areas were outside the urban limits for Tracy or metropolitan Stockton, where vacant land was already available for the development. In addition, the County's proposed General Plan would have created significant new barriers to restoration of wildlife and fish habitat along the San Joaquin River in conflict with the Delta Plan, potentially frustrating the Paradise Cut flood bypass project.

Over the past three years, through comment letters and meetings with county planning department staff, county supervisors, and staff and board members of the

Working with the Council, San Joaquin County adopted a General Plan that aligns with the Delta Plan and benefits all involved: farmland remains available for Delta farmers, flood hazards are reduced, habitat restoration projects remain feasible, and land remains available for development

San Joaquin County Council of Governments, which oversees the region's Sustainable Communities Strategy, the County adopted a General Plan that benefits all involved: 2,000 acres of farmland remains available for Delta farmers, flood hazards are reduced, habitat restoration projects, including the Paradise Cut flood bypass, remain feasible, the County's approval process is streamlined, and land for development remains available inside the region's cities, where flood risks are lower and Delta resources are not affected.

Council staff also reviewed and commented on proposed land use-related planning actions within the Delta for consistency with Delta Plan goals, policies, and recommendations intended to protect and enhance the Delta's lands and communities. Council staff reviewed draft policy and environmental review documents prepared by local and State agencies for proposed General Plan updates and the Bay Area Metropolitan Transportation Commission's 2040 Regional Transportation Plan and Sustainable Communities Strategy.

Working to preserve the Delta's heritage

Legislation that would establish a Sacramento-San Joaquin Delta National Heritage Area, as recommended in the Delta Plan, once again failed to gain traction in Congress. Rather than wait for movement from Washington, D.C., however, the Council awarded the DPC funds to develop a feasibility study for heritage projects in the Delta.

In 2013, the DPC began a Delta Heritage Area Initiative as a way to advance projects that protect and enhance the unique cultural, recreational, and agricultural values of the Delta as an evolving place and demonstrate the region's capacity for a National Heritage Area designation.

The feasibility study will serve as a guidance document for generating interest and funding from non-profit organizations, businesses, foundations, and government agencies that are willing to support the eventual National Heritage Area and, after Congressional designation, to assist with long-term support for protection of the Delta's lands and communities.

The Council also continued to participate in a Delta-as-Place Interagency Working Group, coordinated by the DPC. The working group includes representatives of federal, State, and local agencies focused on coordinating Delta activities involving cultural and historic preservation, economic development, infrastructure, quality of life, and recreation.

Helping to sustain a vital Delta economy

The DPC continued to undertake efforts to help sustain the Delta's economic health. The Delta Community Action Planning initiative is a planning effort focused on

preparing action plans that identify and prioritize actions to improve quality of life, economic development, historic preservation, and public safety in Delta legacy communities. Communities have included Clarksburg, Courtland, and Walnut Grove.

The DPC released the final community action plans for Clarksburg, Courtland, and Walnut Grove in mid-September and is currently working with Clarksburg and Walnut Grove residents, the Courtland Town Association, and State and local agencies on next steps. Implementation efforts thus far have included the installation of new stop signs at the intersection of Highway 160 and the Walnut Grove bridge in Walnut Grove, and a new Clarksburg community website.

Using science to help combat invasive aquatic weeds

Invasive aquatic vegetation is a major stressor in the Delta, with significant economic and ecological effects resulting in impacts to navigation, recreation, ecosystem function, and water quality. One of the Delta Plan's regulations is targeted at reducing the likelihood that a project would contribute further to the problem of invasive aquatic weeds in the Delta either through avoiding their introduction or by designing actions so that they do not exacerbate the current invasive weed problem. The Delta Plan also recommends that agencies prioritize and fully implement actions to control non-native invasive species

Based on a late 2015 symposium hosted by the Delta Stewardship Council, Delta Conservancy, and University of California, Davis, scientists this year produced a report currently undergoing peer review that summarizes the state of knowledge and provides direction for future coordinated research, management actions, and policy. The paper describes how remote sensing technology, mechanical, chemical, and biological control, as well as community science networks all have been effective management tools. But that effectiveness has been hindered by a complex regulatory structure, lack of a consistent monitoring program, specific regulations that restrict treatments, and funding cuts.

The Delta Region Areawide Aquatic Weed Project is a multi-agency and university effort funded by the United States Department of Agriculture focusing primarily on water hyacinth, Brazilian waterweed, and a shoreline invasive giant reed. Remote sensing technologies, knowledge of aquatic weed growth cycles, knowledge of existing and new biological control options, as well as best management practices and nutrient abatement efforts are being used to increase the effectiveness and efficiency of aquatic weed management in the Delta.

Invasive aquatic vegetation is a major stressor in the Delta, with significant economic and ecological effects resulting in impacts to navigation, recreation, ecosystem function, and water quality. State agencies actively spray herbicide to eradicate the infestation of hyacinth and other weeds in the Delta.

Investing Wisely to Reduce Risk from Floods

PERFORMANCE SNAPSHOT

Progress: Flood Risk Reduction

Emergency preparedness in the Delta continues to be improved as the recommendations of the Delta Plan and the Delta Multi-Hazard Coordination Task Force are implemented. In 2016, all projects funded by the Delta Emergency Communications Grant were completed and the new radio system shared by Delta emergency responders was tested twice. The Delta Protection Commission completed a feasibility study for a Delta Flood Risk Management Assessment District. While the Delta Levees Investment Strategy was slightly delayed, major milestones of the project were completed in 2016 including the publication of the Risk Analysis Methodology and presentation of draft amendments to the Delta Plan's current regulatory policies and recommendations.

Of the Delta Plan's 25 administrative measures for water supply reliability, four are completed, six have yet to start, and the rest are in varying stages of completion.

Council develops strategy to prioritize State spending on Delta levees

Grants to small communities help reduce risks for Delta residents

Yolo Bypass partnership improves flood and wildlife management

As envisioned in the Delta Plan, the risk of flooding in the Delta will be reduced despite a rising sea level and altered runoff patterns. Delta residents, local governments, and businesses will be better prepared to respond when floods threaten. Bypasses will be expanded; channels will be improved; and strong, well-maintained levees will protect local communities and State interests. Rural areas and the Delta's legacy communities will also be protected from flood risks by careful land use planning that discourages urban development in flood-threatened areas. Local agencies will be better financed and protected through a locally controlled emergency response and flood protection district, with fee assessment authority and State funds. Desired projects will be focused at State interests in the Delta, with some of that activity protecting local interests as well.

Eliminating flood risks will be impossible, but prudent planning, reasonable land development, and improved flood management will significantly reduce risk, and contribute to achieving the coequal goals of a more reliable water supply, and a protected and restored Delta ecosystem.

Delta Levees Investment Strategy incorporates several core strategies

The Delta Reform Act called on the Council to lead a multi-agency effort, in consultation with the Central Valley Flood Protection Board, to establish and adopt, as a part of the Delta Plan, priorities for State investments in levee operation, maintenance and improvement for both project and non-project levees in the Delta. Currently, the Delta Plan includes interim priorities for State investment in Delta levees and the Council now is updating those priorities by developing the Delta Levee Investment Strategy.

The strategy will help focus State funding on levee improvements and other actions that will achieve the greatest reduction in threats to lives and property (including important infrastructure), and the most benefit to safeguard water supply and restore the Delta ecosystem, while fully considering the unique values of the Delta's farms and communities.

Dozens of utility services are located throughout the Delta including electrical transmission lines; natural gas pipelines; radio, cellular telephone, and television transmission towers; petroleum transportation pipelines; and water transportation canals and pipelines. All have a stake in the integrity of Delta levees.

The Council has developed the most comprehensive and sophisticated database of the key resources—levee conditions, lives and property, water supply, habitat, and other assets —to identify areas where levee improvements are crucial. The database supports a computer-based, interactive planning tool to help summarize and visualize current risks, as well as the risk reduction achieved by potential future levee projects. Using this risk-informed analysis, the Council is developing and will recommend a portfolio of actions that can reduce the flood risks in the Delta and Suisun Marsh.

In December, the Council released a discussion draft of its levee investment priorities for the Delta Plan. The draft is expected to lead to an amendment updating the Delta Plan's priorities for State levee investments and other Delta Plan risk management provisions.

Improving residential flood protection

The Small Communities Flood Risk Reduction Program is a cost-share funding program run by DWR that provides local assistance to communities with 200 to 10,000 residents that are protected by the State Plan of Flood Control. In the Delta, these include Walnut Grove, Isleton, Locke, Clarksburg, Courtland and Freeport. The program was created as a result of the 2012 Central Valley Flood Protection Plan, and is intended to reduce flood risk for small communities.

Initially, funding is being provided to study the feasibility of potential flood risk reduction projects and will be awarded in multiple phases. Communities selected to receive funding through the first phase will be awarded funds to complete a feasibility study of flood risk reduction projects. Funding for design and construction will be awarded in subsequent phases. These projects must repair, rehabilitate, reconstruct, or replace State Plan of Flood Control facilities (e.g., levees, weirs, bypasses) and be consistent with Central Valley Flood Protection Plan goals and objectives.

Protect and expand floodways, floodplains, and bypasses

Fifteen branches of federal, State, and local government have agreed to work together to plan projects in the Yolo Bypass and Cache Slough region to restore wildlife habitat, better manage floods, preserve farmland, improve water supply and quality, and provide economic development and recreation.

This partnership, formalized in a Memorandum of Understanding (MOU) signed in May 2016, provides strategic input on the implementation of projects that include strengthening and setting back levees, removing barriers to fish passage, sustaining agricultural operations, and making it easier for salmon to rear in the Yolo Bypass floodplain.

The MOU helps coordinate and synchronize efforts of 15 separate federal, State and local agencies in the Yolo Bypass, a 92-square-mile swath of farmland and wetlands that serves as a flood safety valve to protect the cities of Davis, Woodland, West Sacramento, and Sacramento, as well as important agricultural lands and several small communities. Designed in the early 1900s by the U.S. Army Corps of Engineers in collaboration with the State of California, the 41-mile-long Yolo Bypass can carry four times the bankfull flow of the Sacramento River (80,000 vs. 300,000 cfs).

Delta Emergency Communications Improved

The Delta Plan recommended that responsible local, State, and federal agencies with emergency response authority consider and implement the recommendations of the 2012 Sacramento-San Joaquin Delta Multi-Hazard Coordination Task Force. Five Delta counties and one local agency completed work in 2016 on a recommendation to improve emergency communication throughout the Delta and across county lines. This $5 million project, funded by DWR, streamlines emergency response by providing interoperable radio communications for emergency responders in the Delta and resolving conflicts that had occurred previously between the multiple radio frequencies used by various agencies by utilizing State Mutual Aid frequencies.

These State Mutual Aid frequencies have the advantage of being programmed into all public safety radios, depending on the frequency band of the radio. Therefore, any first responder showing up can operate on at least one of the new Disaster Information Reporting System base radios, which are installed at the Emergency Operations Centers for the five Delta counties and DWR, thus linking the six together.

The science of levee maintenance and improvement

One of the responsibilities of the Delta ISB is to provide oversight of the scientific research, monitoring, and assessment programs that support adaptive management of the Delta through periodic programmatic reviews.

This year the Delta ISB convened a public workshop about Delta levee science focused on hazards from earthquakes and high water, resulting in a summary paper. Earthquake hazards in the Delta include ground motions from Bay Area earthquakes, infrequent earthquake recurrence on faults beneath the Delta, and levee fills prone to earthquake-induced liquefaction. The scientists noted that large uncertainties attend all these seismic elements of levee hazard and questioned whether the Delta ground motions previously computed for Bay Area earthquakes are too large. Hazards from high water were deemed greatest from the confluence of high river discharge, wind-driven surge and waves, and high tides and will likely be made worse by climate change.

Noting that major risk assessments have used available data on these hazards without mandates to advance the science, the workshop identified the need to expand observations of Delta ground motions, improve estimates of geologically recent displacement on faults beneath the Delta, further identify liquefiable materials and mechanisms beneath levees, continue airborne measurements of land-level movement, update mapping of the area of remaining peat, and provide fuller documentation of past levee failures.

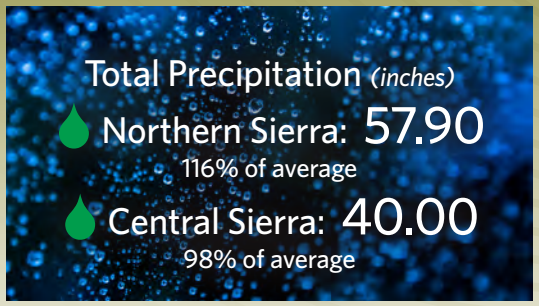
2016 By the Numbers

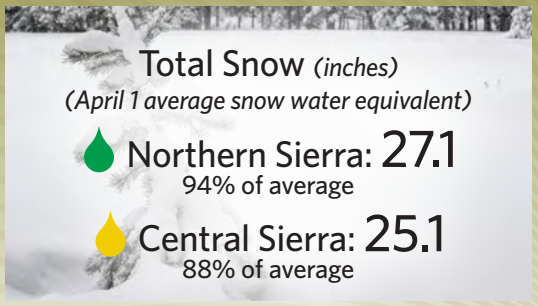
Water Years run from Oct. 1-Sept.30. Units of water measured in million acre-feet are abbreviated as *maf*.

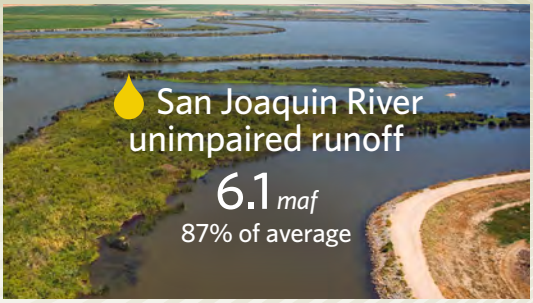
Color coding for ratings of current Water Year's value (percent of average):

Good >90% Fair 75-90% Poor 50-74% Bad <50%

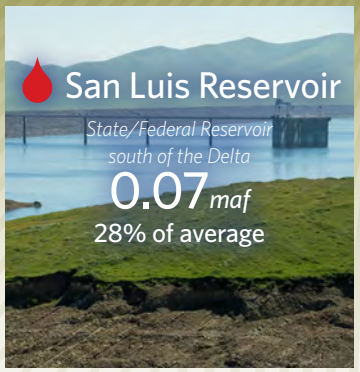
What Nature Delivered: What would have flowed through the Delta without human influences on the watershed?







End-of-year Reservoir Storage:



Species Indicators of Ecosystem Health

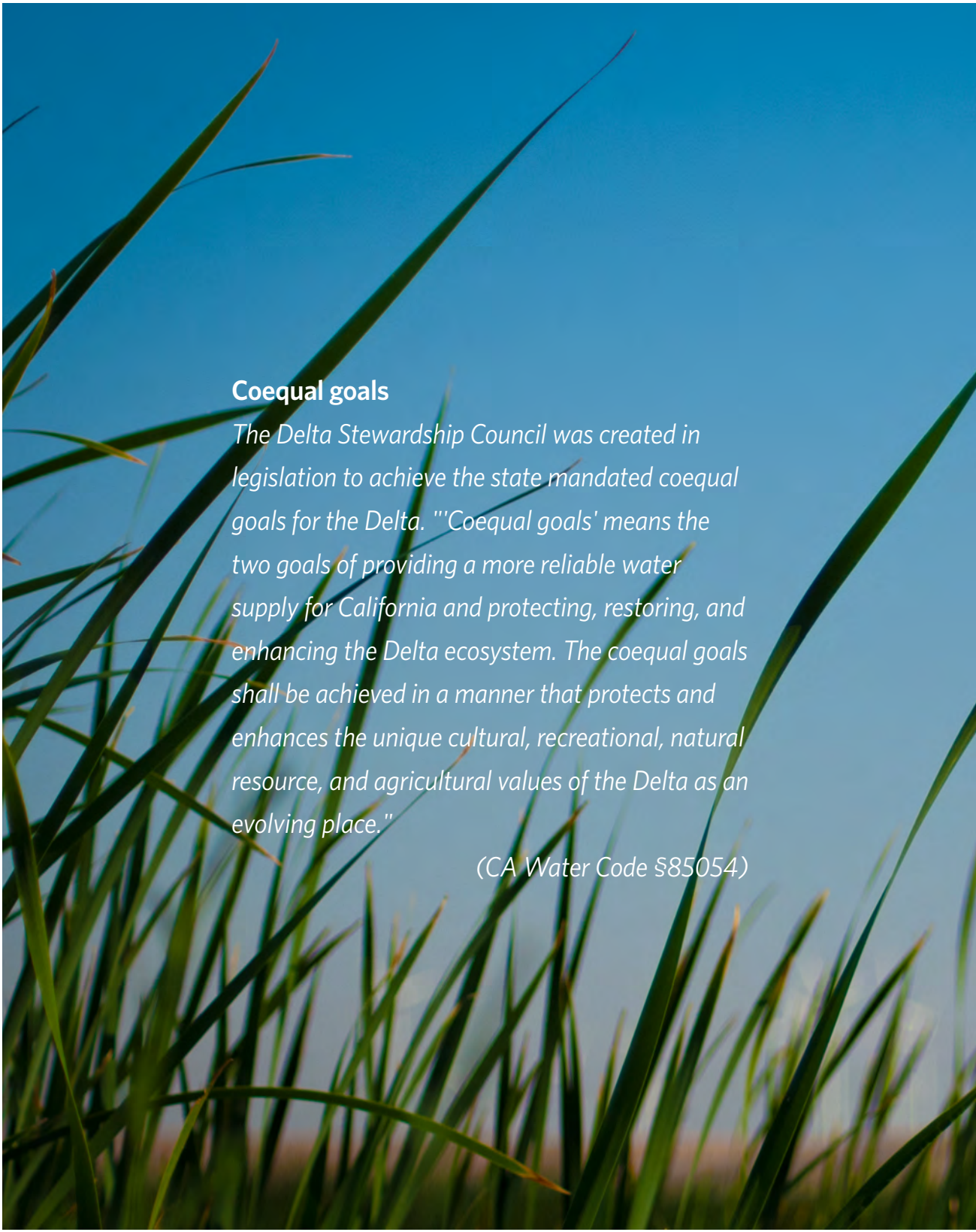
The estimate of the number of winter-run adults returning to spawn is calculated based on carcass counts in the upper Sacramento River.

The Fall Midwater Trawl program began in 1967 and typically samples from San Pablo Bay through the Delta every month from September to December. This program was initiated to determine the relative abundance and distribution of striped bass in the estuary, but the data has also been used for other upper estuary pelagic species.

Indices of abundance are not population sizes. Instead, they are calculated using catch data from 100 "index" stations grouped into 17 regional "areas." Because equipment and methods have remained consistent since the survey's inception, indices can be compared over time. Fall Midwater Trawl indices have historically ranged in the thousands for delta smelt, tens of thousands for longfin smelt, and thousands for Sacramento River winter-run Chinook salmon spawners.

Water Conservation

The cumulative statewide savings from June 2015 through November 2016 was 22.6 percent, compared with the same months in 2013. Since June 2015, 2.35 million acre-feet of water has been saved — enough water to supply more than 11 million people, or more than one-quarter the state's population, for a year.



Coequal goals

The Delta Stewardship Council was created in legislation to achieve the state mandated coequal goals for the Delta. "'Coequal goals' means the two goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The coequal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place."

(CA Water Code §85054)